

Appendix D

CORPSCON Technical Documentation and Operating Instructions

D-1. General

a. Background. The National Geodetic Survey developed the conversion program NADCON (North American Datum Conversion) to provide consistent results when converting to and from North American Datum of 1983 (NAD 83). The technique used is based on a bi-harmonic equation classically used to model plate deflections. NADCON works exclusively in geographical coordinates (Latitude/Longitude).

(1) The U.S. Army Topographic Engineering Center (TEC) created a more comprehensive program CORPSCON (Corps Convert), which is based on NADCON (NADCON operates within CORPSCON). In addition to transformations between NAD 83 and NAD 27 geographical coordinates, CORPSCON also converts between State Plane Coordinates Systems (SPCS), geographical coordinates, and Universal Transverse Mercator (UTM) coordinates, thus eliminating several steps in the total process of converting between grid coordinates on NAD 27 and grid coordinates on NAD 83. Inputs can be in either geographic, UTM, or SPCS coordinates (SPCS 27 X and Y or SPCS 83 northing and easting). This program can also be used to convert between grid and geographic coordinates on the same datum.

(2) The Federal Geodetic Control Subcommittee (FGCS) has adopted NAD 83 as the official horizontal datum for U.S. surveying and mapping activities performed or financed by the Federal Government. The FGCS also stated that, NADCON will be the standard conversion method for all mathematical transformations between NAD 83 and NAD 27. For further information reference Chapter 4 of this EM.

b. Coverage. The current version performs datum conversions for the continental U.S. (CONUS), including the 200-mile commercial zone (CONUS_EXT), Puerto Rico/U.S. Virgin Islands (PR/USVI), Alaska, and Hawaii. **This program does not provide conversion to High Accuracy Reference Networks (HARN's).**

D-2. Source of Program and Assistance

Copies of CORPSCON can be obtained from the address below. An initial distribution of CORPSCON will be

made to FOA surveying and mapping points-of-contact concurrently with this documentation. CORPSCON was designed to be easily used by those with minimal computer experience. The following documentation gives detailed instructions for installing and running CORPSCON. If problems with the program are encountered, contact:

Director
U.S. Army Topographic Engineering Center
ATTN: CETEC-TD-GS, (Reference CORPSCON)
7701 Telegraph Road
Alexandria, Virginia 22310-3864
(703) 355-2766

D-3. Program and Data Files

a. CORPSCON consists of the following program files that must be present to run the program:

CORPSCON.EXE	CORPS27.EXE
CORPS83.EXE	CORPSNAD.EXE
CORPSUTM.EXE	CORPSCON.S27
CORPCON.S83	CORPSCON.HLP

b. The information file, READ.ME, contains information on installing and running CORPSCON. The following data files are required to perform datum conversions in CONUS, HAWAII, and PR/USVI:

CONUS.LAS	CONUS.LOS
PRVILAS	PRVL.LOS
HAWAII.LAS	HAWAII.LOS

c. The following data files are required for conversions in Alaska:

ALASKA.LAS	ALASKA.LOS
STLRNC.LAS	STLRNC.LOS
STGEORGE.LAS	STGEORGE.LOS
STPAUL.LAS	STPAUL.LOS

d. FOAs are being sent data files depending on their geographic locations. However, any of the above geographic databases can be obtained upon request from the office listed in paragraph D-2.

D-4. Hardware Requirements

An 80286 (or higher) processor Microsoft Disk Operating System (MS-DOS) based personal computer with a math coprocessor is required to run this program. A hard disk drive is recommended, but not required. Conversions

from floppy drives take considerably longer. At least one megabyte of disk space (floppy or hard disk) is needed to accommodate the program files, datum model files, and input/output files; and at least 52 kilobytes of Random Access Memory (RAM) is needed for program execution. The CORPSCON program and data files are mailed on 5.25-inch 1.2 megabyte floppy disks (other media are available from the office listed in paragraph D-2). CORPSCON is compatible with most PC monitors, although color monitors (EGA and VGA) provide the most favorable and easily discernible menu display. If a printer is to be used, it must be interfaced through the parallel port (LPT1 or LPT2) in order to be recognized by the program.

D-5. Software Requirements

a. This program requires MS-DOS, version 3.0 or higher. Terminate and Stay Resident (TSR) programs, such as Side Kick, have in the past interfered with the proper execution of CORPSCON. The result of this interference has been erroneous results; therefore it is recommended that the user halt TSR programs prior to executing CORPSCON. Also, other programs that use DOS shells, such as spreadsheets and word processors, must be completely terminated before running CORPSCON.

b. Your CONFIG.SYS file must contain the statement "FILES=20" thus allocating a sufficient number of open files needed for program execution. Consult your DOS manual for further information on how to check and/or modify your CONFIG.SYS file.

D-6. Installation Procedures

a. Disk requirements. The CORPSCON program and data files should be copied to a hard disk, if available, for faster program performance and to ensure ample disk space. If a hard disk is not available, then the program can be run from a high density floppy disk drive (at least 1.2 megabytes capacity). This requires that the CORPSCON program and data files for CONUS and PR/USVI be copied onto a single high density floppy disk. A hard disk is required if the Alaska data files are being used.

b. Hard disk installation. The following instructions assume you will install CORPSCON on your C drive in a directory named CORPSCON. If you wish to install it on another drive or another directory, change the drive and/or directory designations as appropriate.

(1) At the C:\> prompt, create the CORPSCON directory by typing:

MD C:\CORPSCON <ENTER>

(2) Change to the CORPSCON directory by typing:

CD C:\CORPSCON <ENTER>

(3) Place the CORPSCON floppy disk in the A drive (or B). Note CORPSCON is on a high-density disk. Be certain that your computer has a high-density drive.

(4) At the C:\CORPSCON> prompt, copy the files into the CORPSCON directory by typing:

COPY A:. * <ENTER>*

(5) At the C:\CORPSCON> prompt, type:

DIR <ENTER>

to verify that the files listed in paragraph (2) were properly copied.

D-7. Operating Instructions

a. Change to the drive/directory containing the program files. Type CORPSCON and hit the enter key to start the program. A single screen menu will be displayed with three windows, "CORPSCON Main Menu," "Send Data," and "Console Window."

NOTE: An identification message at the top of the menu should read "CORPSCON v3.0." If the message has a number lower than 3.0 or the menu has "Beta CORPSCON v3.0," then this is an older version of CORPSCON and it should be disregarded.

b. The "CORPSCON Main Menu" has three basic functions that can be selected by typing the highlighted numeric (1, 2, or 3) which is located by that respective function. The "Input Data Format" specifies the coordinate system in which the original coordinates are in. The "Output Data Format" specifies the coordinate system in which the original coordinates are to be converted. CORPSCON displays a listing of supported coordinate systems when either of these two options in the "CORPSCON Main Menu" is selected. Using the cursor keys (Up/Down) the user can move through the different systems. Hitting the Enter key selects the coordinate system

which is blinking. Below is a representation of that menu.

```

+-----+
| Select the Input Data Format |
|                               |
| 1 - State Plane, NAD 27     |
|                               |
| 2 - State Plane, NAD 83     |
|                               |
| 3 - UTM Coord., NAD 27      |
|                               |
| 4 - UTM Coord., NAD 83      |
|                               |
| 5 - Geographic Coordinates, NAD 27 |
|                               |
| 6 - Geographic Coordinates, NAD 83 |
+-----+

```

c. If selecting either of the grid coordinate systems, CORPSCON prompts the user for units (U.S. Foot, International Foot, or Meters) and the UTM or state plane zone. To select a state plane zone (in NAD 27 or NAD 83), CORPSCON will display a menu in the console window. Using the Page-Up and Page-Down keys and cursor keys, a user can quickly move through several pages of zones and select an individual zone to be used in the conversion. Selection is made by moving the highlighted cursor over the intended zone and hitting the <Enter> key.

NOTE: Throughout the CORPSCON program, the bottom line of the main screen changes showing the user the commands (i.e. function keys) that are valid.

d. The "Input Data Source" specifies the type or format of input data. As above, the selection of this option displays a menu of supported input data sources. Utilization of the cursor keys combined with the <Enter> key allows the user to select a format. Below is a representation of that menu.

```

+-----+
| Select the Input Source for the Data |
|                               |
| 1 - From Keyboard (Manual Entry)    |
| 2 - From Batch File (ASCII Format)   |
| 3 - From NGS Bluebook (*80/*81*)   |
| 4 - From GeoLab File                |
| 5 - From Fillnet File               |
+-----+

```

The "From Keyboard" option prompts the user in the console window for a single point to convert upon start of the conversion. A sample of that display is as follows:

For geographic coordinate entry:

```

Enter Input Coordinate..

1 - Enter Latitude:    00 00 00.00000
2 - Enter Longitude:   000 00 00.00000
3 - Enter Name:

0 - To Accept Above Point

Enter Selection -

```

For plane coordinate entry:

```

Enter Input Coordinate..

1 - Enter Easting (X): 0.000
2 - Enter Northing (Y): 0.000
3 - Enter Name:

0 - To Accept Above Point

Enter Selection -

```

Selections are made by selecting the numeric associated with the entry. For example, to enter the station name type 3, and then start typing in the name.

NOTE: A maximum of twenty characters can be used for the name.

e. After entering the coordinates, the values should be checked before pressing the 0, to be certain that the numbers are correct. Pressing 0 starts the conversion computation. If changes need to be made, type the selection number corresponding to the invalid number and reenter the proper coordinate.

NOTE: Points in the Alaska Aleutians that lie in east longitude, i.e., Shimya, must be entered as a west longitude exceeding 180 degrees. For example, a longitude of 174" 05' 12" East would be entered as 185" 54' 48". Also, west longitude, for all points within the U.S. and its territories, is assumed positive.

f. All other selections in the data source menu will prompt the user for a file upon start of the conversion. The formats of these files vary depending on the type of file. The "From Batch file (ASCII format)" is the most common and general format. These files can be created outside of CORPSCON with other programs, e.g., word processors, spreadsheets, etc., that can make an ASCII file. There are two formats that exist for an ASCII batch file, examples of each are listed below:

For geographic coordinates:

```
;This is a sample file
;Agency: USATEC
;Project: Sample File,
;NAD 83 Geographic Coordinates
      Test Site,38 44 0.0,77 8 0.0111
```

For grid coordinates:

```
;This is a sample file
;Agency: USATEC
;Project: Sample File,
;NAD 83 State Plane Zone 4501,U.S FOOT
      Test Site,11872752.0,6953015.832
```

Comment lines have a “;” in the first column of that line. There is no limit on the number of comment lines a file can have. CORPSCON disregards any line starting with a “;”. The actual data in the ASCII file are broken down into three fields separated by commas. The first field contains a twenty-character name. The format of the next two fields depends on whether the data are plane or geographic coordinates. For geographic coordinates, the second field contains the latitude (ϕ) and the third contains the longitude (λ) of the station. The latitude and longitude fields contain three values: degrees, minutes, and seconds. Each value is separated by a space. In order for CORPSCON to function properly, there must be a value for each field (even if zero). For plane coordinates, the second field contains the easting (x) and the third field contains the northing (y).

g. Another file format that CORPSCON can use are Bluebook files with *80* and *81* records. Also, CORPSCON can strip geographic coordinates from GeoLab and Fillnet output files. This capability is based on GeoLab version 1.82s (* .lis files) and Fillnet version 3.00 (* .fop files). Outputs generated from different versions of these software packages may not be recognized by CORPSCON if the vendor has not retained common output formats between version releases.

h. The “Send Data” menu allows the user to specify what output formats will be created. There are four options: “To Console,” “To Printer,” “To Printer File,” and “To Data File.” The highlighted letter toggles these options on and off, which are, respectively, C, P, F, and D.

i. The “To Console” option displays the original and converted coordinates in the console window (the third area located on the screen). Using the <Page-Up> and <Page-Down> keys a user can cycle through the points. Below is an example of that option.

```
NAME:      Test Site      Record 1 of 1.
           INPUT      OUTPUT
LAT:  38 44 00.00000      N: 6953015.83296
LON:  077 08 00.00000      E: 11872752.62967
           Convergence DD(A) & Scale Factor (K)
           A: 00 51 10.65989
           K: 0.999950422
```

NOTE: After viewing the coordinates in the console window, hit the <ESC> key to continue. No printing will occur until the user has finished viewing the coordinates in the console window.

j. The “To Printer” option sends the data directly to the printer in a publishable format.

k. The “To Printer File” option sends the same publishable format as above to a user specified file. When selecting this option, CORPSCON will prompt the user for a filename in which to write this format.

l. Using either of the above two output options (to the printer or a printer file), CORPSCON creates a specific format that consists of a file header followed by a listing of the input and output data. The header states the form of the inputs (e.g., NAD 27 state plane) and the outputs (e.g., NAD 83 geographic). The input coordinates are listed under the “Input” column and the output coordinates are similarly listed under the “Output” column. If state plane or UTM values are used for input or output, then the convergence and scale factor are listed under the coordinates. If a datum conversion is made from NAD 27 to NAD 83, or vice versa, then the datum shift, in meters, is shown under the coordinates. If the inputs and outputs for a datum conversion are in state plane coordinates, then the state plane coordinate shift, in feet, is shown after the datum shift.

m. The “To Data File” option sends an abbreviated output format to another file. This is an important change from previous versions of CORPSCON in that only the point name and converted coordinates are written to the data file. The exception to the previous statement is that the first four or five lines in the file are comment lines of the format:

```
;Software: CORPSCON v3.0, Agency: USATEC
;Project: Sample File,
;Orig. Coord. on NAD 83 Geographic Coordinates
;Trans.Coord. NAD 83 State Plane Zone 4501, U.S. FOOT
      Test Site,11872752.62967, 6953015.83296
```

When selecting this option, CORPSCON will prompt the user for a file name in which to write this format.

n. CORPSCON has several other options that are briefly explained below.

(1) The <ESC> key is used to exit CORPSCON.

(2) The <F1> key displays a help screen that a user can cycle through by using the <Page-Up> and <Page-Down> keys.

(3) The <F2> key allows the user to change the project title and agency that appears in the printouts.

Printout Titles
Project Name: Sample File
Company Name: USATEC

Pressing the <ESC> key in this menu retains the current name listed.

(4) The <F3> key creates a batch file (which the user is prompted for) while in CORPSCON. Depending on the input format specified (geographic or plane coordinates) the user is prompted with the manual input sequence as described previously. The difference is that after typing 0 to select the point, the user is prompted again for another point. This process continues until the user hits the <ESC> key to close the batch file.

(5) The <F4> key starts the conversion.

D-8. Error Messages

CORPSCON is designed to prompt the user for most cases in which a system or runtime error occurs. These errors are as follows:

a. No math co-processor. A math co-processor (hardware item) must be installed in the computer to run the program.

b. No input file. A file with the name specified was not found; enter the correct file name or create the file before running CORPSCON. Check to be certain that the file and program CORPSCON are in same directory and subdirectory.

c. Printer error. The program is unable to send the output to the printer. Check the following:

- printer connection
- printer turned on
- printer interfaced through the parallel port
- paper in printer
- printer in "on-line" or "ready-to-print" status